

**A. TITLE OF THE INVENTION**

**EMULSIFIED LIQUID SHORTENING COMPOSITIONS COMPRISING DIETARY FIBER  
GEL, WATER AND LIPID.**

**B. CROSS-REFERENCE TO RELATED APPLICATIONS**

Not Applicable

**C. STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH/DEVELOPMENT**

The present invention does not involve any form of federally sponsored research or development.

**D. BACKGROUND OF THE INVENTION**

The present invention relates to emulsified liquid shortening compositions comprising dietary fiber gel, water and lipid. Recent media attention to the global problem of obesity demonstrates a need for greater availability of functional and delicious foods with low caloric and fat content.

Another development in recent health science indicates that an increase in consumption of dietary fiber can have significant health benefits such as decreasing blood cholesterol levels, reduction of colon cancer risk and improving digestive tract health and functioning.

In recent years, some companies have begun to offer reduced fat foods. Reduction of fat content of foods, however, generally has an adverse effect on the taste and texture of these foods. Reducing the fat content, for example, can result in gritty textures and dry consistencies and even the addition of an unpalatable “chemical” type taste to an otherwise delicious food. As a result, the consuming public faces the choice of eating delicious, yet high in fat food, or eating healthier food they don’t enjoy.

The absence of a means to reduce the fat content of foods while still producing desirably flavored and textured foods presents an unmet need in today’s food and beverage industry.

## E. BRIEF SUMMARY OF THE INVENTION

It is an object of the present invention to answer this unmet need by providing a unique composition of matter embodied by emulsified liquid shortening compositions comprising dietary fiber gel for calorie reduced foods, water and fat or oil (herein the fat and oil component is referred to as "lipid"; the compositions are referred to as "emulsified compositions"). One or more of the following functional foods can be added to the composition: high omega three and omega six oils and pure omega three and omega six fatty acids, medium chain triglyceride, beta carotene, calcium estearate, vitamin E, bioflavonoids, fagopyritrol, polyphenolic antioxidants of vegetable origin, lycopene, luteine and soluble fiber, for example Beta-Glucan derived from yeast, and other soluble fibers derived from grain, flax seed, and other vegetable and fruit fiber sources. This emulsified composition can be used as a substitute for traditionally used fats, oils and liquid shortenings. This emulsified composition can also be used on a prorated basis as a vector for the introduction of dietary fiber gels into formulated foods to partially and totally replace other hydrocolloids normally found in formulated foods, thus providing an effective means to reduce production costs of formulated foods. It is another object of the present invention to provide a method of producing said emulsified compositions.

Dietary fiber gel for calorie reduced foods holds the key to meeting this need. Dietary fiber gel for calorie reduced foods (hereinafter, "dietary fiber gel") is fully described in U.S. Patent number 5,766,662 (the '662 patent). This dietary fiber gel comprises insoluble dietary fibers consisting of morphologically disintegrated cellular structures, and is characterized by their ability to retain large amounts of water. Additionally, this dietary fiber gel is characterized by its high viscosity at low solid levels. Other insoluble fibers consist of morphologically in tact cellular structures, and thus impart a gritty texture to the foods in which they are contained. The dietary fiber gel disclosed in the '662 patent, however, consists of morphologically disintegrated cellular structures and thus impart a smoother texture than other insoluble fiber formulations.

According to the present invention, dietary fiber gel can be subjected to micro-particulation by high shear via homogenization and combined with water and lipid. The resultant product can then be subjected to colloid milling or other equivalent methods of emulsification, for example homogenization and ultrasonification treatment, in the presence of food grade emulsifiers, for example lecithin, and the emulsified mixture can be pasteurized. Functional foods, including, but not limited to, high omega three and omega six oils and pure omega three and omega six fatty acids, medium chain triglyceride, beta carotene, calcium estearate, vitamin E, bioflavonoids, fagopyritrol, polyphenolic antioxidants of vegetable origin, lycopene, luteine and soluble fiber, for example Beta-Glucan derived from yeast, and other soluble fibers derived from grain, flax seed, and other vegetable and fruit fiber sources can be added for further health benefits. The resultant compositions, as well as the method of producing them, are the subject of this invention.

Further objects, advantages and features of the present invention will present themselves in the following detailed description.

#### **F. DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

This invention is directed to emulsified liquid shortening compositions comprising dietary fiber gel, water and lipid, as well as a method for making the same.

#### **DESCRIPTION OF THE EMULSIFIED COMPOSITION**

According to the present invention dietary fiber gel can be provided in combination with water and a lipid component, the combination being an emulsified composition of matter comprising dietary fiber gel, water and lipid. This composition of matter can be pasteurized. Other ingredients, most notably functional foods such as high omega three and omega six oils and pure omega three and omega six fatty acids, medium chain triglyceride, beta carotene, calcium estearate, vitamin E, bioflavonoids, fagopyritrol, polyphenolic antioxidants of vegetable origin, lycopene, luteine and soluble fiber, for example Beta-Glucan derived from yeast, and other soluble fibers derived from grain, flax seed, and other vegetable and fruit fiber sources can be added.

Water content of the composition can be in the range of 30 percent to 80 percent by weight.

Dietary fiber gel concentrations can range from 0.3 percent to 20 percent by weight. The dietary fiber gel can be the product of the '662 patent, and can be a cellulose hydrolyzed version thereof.

The remainder of the composition comprises lipid, including fats, oils and liquid shortenings, and if included, a functional food and some combination of functional foods to be further described infra.

The lipid component can comprise any oleic fatty acids, flax seed oil, olive oil, canola oil, corn oil, walnut oil, peanut oil, and any other vegetable oil, and any combination thereof.

Functional foods can be added to the composition to increase the health benefits of prepared foods comprising the emulsified liquid shortening compositions comprising dietary fiber gel for calorie reduced foods, water and lipid. The following functional foods and their respective ranges are given by way of example, but other functional foods, notably fat soluble functional foods, can be added as well. High omega three oils and omega six oils, for example flax seed oil, can be added in concentrations of 1 percent to 50 percent of the overall composition by weight. Pure omega three fatty acids and omega six fatty acids can be added in concentrations ranging from 1 percent to 30 percent of the overall composition by weight. If both pure omega three fatty acids and high omega three oils are used, their respective concentrations can be prorated to give an appropriate end concentration of high omega three fatty acids. If both pure omega six fatty acids and high omega six oils are used, their respective concentrations can be prorated to give an appropriate end concentration of high omega six fatty acids. Medium chain triglyceride can be added in concentrations ranging from 1 percent to 50 percent of the overall composition by weight. Fagopyritrol can be added in concentrations of 0.25 percent to 20 percent of the overall composition by weight. Polyphenolic antioxidants of vegetable origin, for example lycopene, beta carotene, luteine, and bioflavonoids can be added in concentrations ranging from 0.25 percent to 20 percent of the overall composition by weight. Soluble fiber, for example beta Glucan, can be added in concentrations ranging from 5 percent to 15 percent of the overall composition by weight. Any

functional foods added to the composition can be added in such concentrations to deliver up to 100 percent, preferably 25 percent to 100 percent, of prevailing recommended daily intake recommendations by the FDA, European Commission, FAO, Codex Alimentarius, or other international authorities.

#### DESCRIPTION OF METHOD OF MAKING THE EMULSIFIED COMPOSITION

At a minimum, the emulsified composition comprises dietary fiber gel, water and lipid. Other ingredients can be added, such as emulsifiers and functional foods.

Emulsifiers are well known in the art, and lecithin is an example of a commonly used emulsifier. Other emulsifiers can be used. Dietary fiber gel is a hydrocolloid and as such has emulsifier properties. Additional emulsifiers can be added on a prorated basis to augment the emulsifier properties of the dietary fiber gel. Emulsifiers such as lecithin, if included, can preferably be added in a concentration ranging from 0.2% to 10.0% so as to deliver a requisite amount of choline, preferably in the range of 0.1 grams to 2.0 grams, per two ounce serving of formulated foods comprising emulsified liquid shortening composition comprising dietary fiber gel for calorie reduced foods, water and lipid.

Functional foods can include high omega three and omega six oils and pure omega three and omega six fatty acids, medium chain triglyceride, beta carotene, calcium estearate, vitamin E, bioflavonoids, fagopyritrol, polyphenolic antioxidants of vegetable origin, lycopene, luteine and soluble fiber, for example beta-glucan derived from yeast, and other soluble fibers derived from grain, flax seed, and other vegetable and fruit fiber sources. Other functional foods that offer health benefits, most notably those functional foods that are fat soluble, can be added as well.

According to the present invention, ingredients to be used are combined and mixed. At a minimum these ingredients comprise dietary fiber gel, water and lipid, but as stated above emulsifier or emulsifiers can be added, as can any of a number of functional foods and a combination thereof. In one preferred embodiment, the dietary fiber gel can be subjected to high shear micro-particulation

124 by colloid milling, homogenization, ultrasonication and any other suitable means prior to combining  
125 the dietary fiber gel with the other ingredients. It is sufficient, however, that high shear micro-  
126 particulation occurs after the dietary fiber gel has been combined with any and all of the other  
127 ingredients.

128         The resultant mixture can be subjected to micro-particulation by high shear. Methods of  
129 micro-particulation can include homogenization and other methods that are well known in the art,  
130 such as colloid milling and ultrasonication treatment. In one preferred embodiment the mixture can  
131 be homogenized by subjecting it to high pressure, preferably in the range of 1500 pounds per square  
132 inch (psi) to 2500 psi, and elevated temperature, preferably in the range of 120 degrees Fahrenheit to  
133 195 degrees Fahrenheit. The resultant product is an emulsified composition. Ideally, this emulsified  
134 composition can have fat droplet sizes in the range of 5 microns to 50 microns, but sizes outside this  
135 range are possible as well.

136         In a preferred embodiment, the emulsified composition can be pasteurized. The composition  
137 can subsequently be aseptically packaged.